

First confirmed population of *Yola bicarinata* (Latreille, 1804) (Coleoptera: Dytiscidae) from Belgium and new records from the Netherlands with notes on its ecology, distribution and phenology

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Abstract

Yola bicarinata (Latreille, 1804) is a West-Mediterranean species, which reaches its northern limit in the Netherlands. In 2010, this species was rediscovered in the Netherlands (VERDONSCHOT *et al.*, 2011) and in 2011 a population of this species was found in the north of Belgium. Moreover, three additional observations were done in the Netherlands. All recent records are summarized and the history of the species in Belgium and the Netherlands is described. Furthermore, notes on the habitat and phenology of the species in Belgium are given.

Keywords: Hydradephaga, Dytiscidae, *Yola bicarinata*, habitat, ecology, Belgium.

Samenvatting

Yola bicarinata (Latreille, 1804) is een Westmediterrane soort die zijn noordelijke grens in Nederland bereikt. In 2010 werd deze soort herontdekt voor Nederland (VERDONSCHOT *et al.*, 2011) en in 2011 werd een populatie van deze soort gevonden in het noorden van België. Tevens werden in Nederland drie extra vondsten gedaan. Alle recente vondsten worden opgesomd en de geschiedenis van de soort in België en Nederland wordt beschreven. Verder wordt de habitat en fenologie van de soort in België beschreven.

Résumé

Yola bicarinata (Latreille, 1804) est une espèce ouest-méditerranéenne qui atteint sa limite nord aux Pays-Bas. En 2010, cette espèce a été redécouverte aux Pays-Bas (VERDONSCHOT *et al.*, 2011) et, en 2011, une population de cette espèce a été trouvée au nord de la Belgique. Depuis, trois occurrences se sont ajoutées pour les Pays-Bas. Toutes les données récentes sont résumées et l'histoire de l'espèce en Belgique et aux Pays-Bas est décrite. En outre, des informations sur l'habitat et la phénologie de cette espèce en Belgique sont mentionnées.

Introduction

Yola bicarinata (Latreille, 1804) is a small (length: 1.6-2.1 mm), dark water beetle with two longitudinal ribs on each elytron and very distinctive yellow markings (Fig. 1).

In the past, there has been a lot of confusion about the presence of *Y. bicarinata* in Belgium. In his catalogue of the water beetles of Belgium, VAN DORSSELAER (1957) included also some species that were to be expected to occur in Belgium, based on their occurrence in neighbouring countries. In this catalogue, these species are indicated by the absence of a number before their name. Not noticing the difference between species with and without a number, SCHAEFLEIN (1971) and FRANSISCOLO (1979) erroneously included Belgium in the distribution of this species. In 1986, BOSMANS & KEIRENS (1986) mention seeing a specimen of *Y. bicarinata* in a collection (found in a clay pit near Boom in 1973) and call the species new for Belgium. KEIRENS (1984) repeated this record in his work of the



Fig. 1. *Yola bicarinata*, 1.8 mm.

Belgium Hydroporinae. DROST *et al.* (1992), apparently not aware of BOSMANS & KEIRENS (1986) and KEIRENS (1984), mention that this species does not occur in Belgium. DOPAGNE (1995) included this species in his checklist of Belgium Dytiscidae and also NILSSON (2010) correctly included Belgium in the list of countries for *Y. bicarinata*.

In April 2011, I found *Yola bicarinata* very abundantly in a fairly recent, shallow pond with a substrate of fine sand and sparse vegetation. Further research in the area revealed more locations. All sites had, at least locally, pioneer characteristics and also the most co-occurring water beetle species were silicophile species (pioneer species occurring on bare mineral substrate).

In 2010, the species also turned up in the Netherlands after an absence of more than a 100 years (VERDONSCHOT *et al.*, 2011). In 2011 and 2013, I found three more locations for this species in the Netherlands.

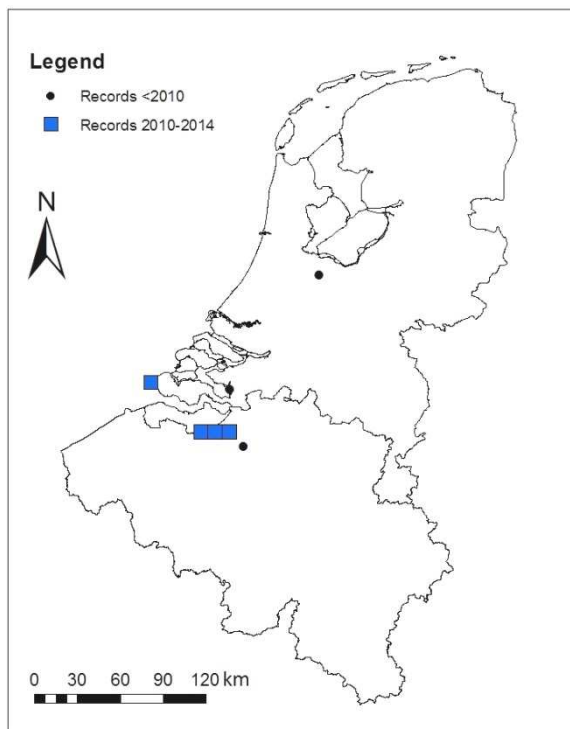


Fig. 2. Map showing all records of *Yola bicarinata* in Belgium and the Netherlands.

Distribution

This species has a mainly West-Mediterranean distribution, which reaches South-Eastern Italy and West-Slovenia in the east and extends in Western-Europe as far north as the Netherlands. In North-Africa, the species occurs in Morocco, Algeria and Tunisia (FRANSISCOLO, 1979; NILSSON, 2010). HENDRICH (1993) gives a record from the Czech Republic based on a specimen in a collection of an unknown collector, but the species was later removed from the Czech catalogue because of serious doubt about the correctness of the material in this collection (BOUKAL *et al.*, 2007). Furthermore, there are two doubtful records from Germany (SCHAEFLEIN, 1971; VERDONSCHOT *et al.*, 2011). A recent map of the distribution of *Yola bicarinata* is provided by VERDONSCHOT *et al.* (2011). A map with all Belgian and Dutch records is given in Fig. 2.

Detailed account of the records in Belgium and the Netherlands

In the Netherlands, the species was first recorded in 1904 near Bergen-op-Zoom, where the species was present until 1909. The second record, also from the Netherlands, consisted of 19 specimens taken near Hilversum in 1907. It was not found again until one specimen turned up in a clay pit near Boom

(Belgium) in 1973, however, it was not recognized until 1986, when the collection was re-examined (BOSMANS & KEIRENS, 1986). Only in 2010, *Y. bicarinata* reappeared in the Netherlands (VERDONSCHOT *et al.*, 2011). In the following years, a total of 14 new localities were found, eleven in Belgium and three in the Netherlands. A detailed account of these recent records is given in Table 1.

Table 1. Detailed account of the recent records. The sites are arranged chronologically according to the discovery.

N°	Country	Locality	Latitude; longitude	Records (leg. & coll. K. Scheers)
1	Belgium	Haasop, Kallo, Oost-Vlaanderen	51,2463; 4,2264	02.IV.2011 (>10 ex.), 10.IV.2011 (5 ex.), 30.IV.2011 (1 ex.), 20.III.2012 (5 ex.), 19.V.2012 (>10 ex.), 07.VIII.2012 (7 ex.), 19.V.2013 (3 ex.)
2	the Netherlands	De Wilde Landen, Heikant, Zeeland	51,2462; 4,0310	09.VI.2011 (1 ex.)
3	Belgium	Steenland, central pond, Kallo, Oost-Vlaanderen	51,2458; 4,2540	01.X.2012 (3 ex.), 28.IX.2014 (7 ex.)
4	Belgium	Verrebroekse Blikken, Verrebroek, Oost-Vlaanderen	51,2588; 4,2063	07.X.2012 (>10 ex.), 15.X.2012 (>10 ex.), 21.IV.2013 (9 ex.)
5	Belgium	Zuidelijke bufferzone, central pond, Kallo, Oost-Vlaanderen	51,2479; 4,2454	07.X.2012 (1 ex.), 01.X.2014 (2 ex.)
6	Belgium	Zuidelijke bufferzone, eastern pond, Kallo, Oost-Vlaanderen	51,2478; 4,2499	07.X.2012 (1 ex.), 01.X.2014 (2 ex.)
7	Belgium	Steenland, northern pond, Kallo, Oost-Vlaanderen	51,2461; 4,2537	19.V.2013 (>10 ex.), 28.IX.2014 (8 ex.)
8	the Netherlands	Boskreek, northern pond, Koewacht, Zeeland	51,2350; 3,9857	03.VI.2013 (>10 ex.)
9	the Netherlands	Boskreek, southern pond, Koewacht, Zeeland	51,2354; 3,9852	03.VI.2013 (>10 ex.)
10	Belgium	Spaans fort, northern pond, Verrebroek, Oost-Vlaanderen	51,2641; 4,1961	24.VI.2013 (6 ex.)
11	Belgium	Spaans fort, southern pond, Verrebroek, Oost-Vlaanderen	51,2550; 4,2011	25.VI.2013 (>10 ex.)
12	Belgium	Steenland, western pond, Kallo, Oost-Vlaanderen	51,2457; 4,2533	28.IX.2014 (2 ex.), 01.X.2014 (2 ex.)
13	Belgium	Steenland, southern pond, Kallo, Oost-Vlaanderen	51,2454; 4,2548	01.X.2014 (2 ex.)
14	Belgium	Haasop, Kallo, Oost-Vlaanderen	51,2466; 4,2379	01.X.2014 (1 ex.)

Habitat and phenology

In the main distribution area, *Yola bicarinata* is a typical species of clear, slow running rivers with gravelly bottom and pools on sand or gravel next to rivers (GUIGNOT, 1947; SCHAEFLEIN, 1971; FRANSISCOLO, 1979; DU CHATENET, 1986). The species also occurs in shallow semi-permanent waters with mineral bottom and sparse vegetation (personal observations). It is in this last habitat that the species occurs in Belgium and the Netherlands, where *Y. bicarinata* seems to have a pioneer-character.

All present locations are exposed, relatively small bodies of water of recent origin with a maximum depth of 1.5 m. The Belgian locations are on reclaimed land, where the substrate consists of fine sand with shell fragments and also in the Netherlands, the substrate is fine sand. In all cases, the water is clear and the vegetation is sparse or at least locally absent (Fig. 3). The adults were only found in the shallow parts, where silt was absent and the bare sand was exposed. Both the salinity and conductivity vary considerably. The pH is high, with values ranging between 7.9 and 9.5. Corresponding with the values mentioned by VERDONSCHOT *et al.* (2011), the water is rich in oxygen with high levels of dissolved oxygen (Fig. 4).



Fig. 3. Habitat of *Yola bicarinata* in the nature reserve Haasop near Kallo, Oost-Vlaanderen in Belgium.

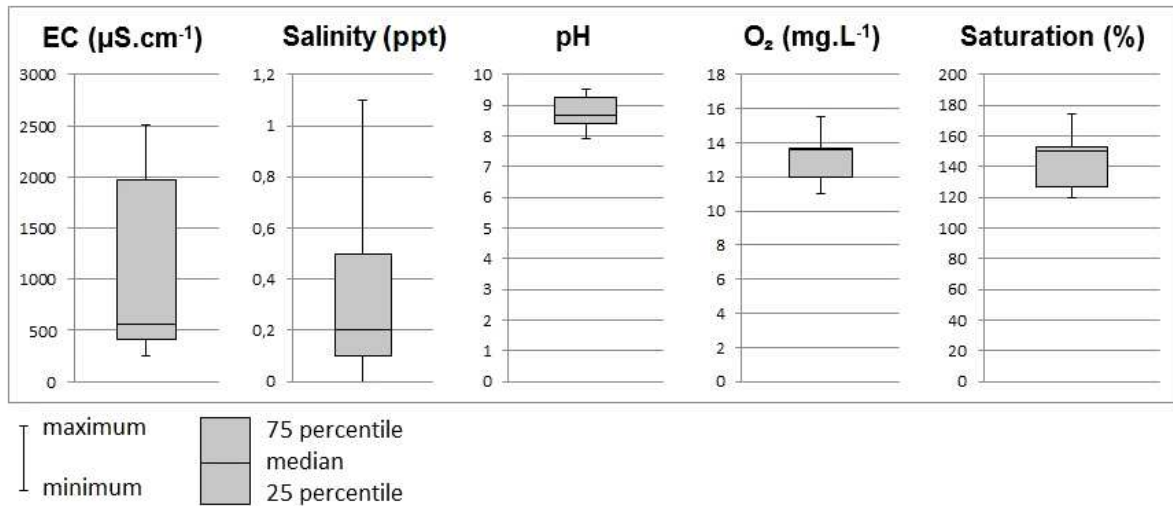


Fig. 4. Boxplots of the conductivity, salinity, pH, oxygen and saturation of the Belgian locations of *Yola bicarinata* (two locations were excluded because their last records date back more than one year and there have been notable changes since then).

Yola bicarinata is a silicophile species in Belgium and the Netherlands. It occurs only on bare sand and ecological succession will lead to ecosystem changes resulting in the loss of the suitable habitat for this species in some pools. All the Belgian and one Dutch location are located in areas where there is a high risk for habitat loss caused by the rapid spread of the invasive exotic plant *Crassula helmsii*. This plant can quickly overtake a pond, causing the loss of vegetation free areas that maintain the populations of *Y. bicarinata*.

In Belgium and the Netherlands, adults of *Yola bicarinata* were recorded from the second half of March till half October. In winter, no specimens could be found, even after an intensive search. Furthermore, the beetles seem to be most active in the sun, being less frequently seen on cloudy and rainy days. At night no active specimens were recorded.

Discussion

The records could indicate that this West-Mediterranean species has known at least three periods in which it expanded its range in the north-west of its distribution area. The first time between 1900 and 1910 (indicated by the historic records in the Netherlands), followed by a retreat. The second expansion resulted in the record near Boom in 1973. Then the species seemed to disappear again until the species expanded its range again resulting in the recent records in the Netherlands and Belgium. This alternation of expanding and retreating of species at the edge of their distribution area is a natural process that sometimes results in a permanent establishment, but is in most cases linked to fluctuating climatic conditions.

Also some other southern water beetles have recently expanded their range to the north (SCHEERS, 2014). If the, possibly climatic driven, conditions leading to the expansion of *Y. bicarinata* maintain, this species is to be expected in Luxembourg, Germany and Great Britain. Only time will tell if this time, *Yola bicarinata* is here to stay.

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